

CONCERNING THE AVAILABILITY OF CERTAIN TAX-
ONOMIC CHARACTERS AND THEIR SIGNIFICANCE.
(DIPTERA).¹

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During the past year or more I have been engaged at various intervals in searching for new characters available in the classification of Diptera, and these efforts have resulted, in some cases, in the selection of characters which will evidently prove of value in due time. Mr. J. R. Malloch has pointed out that the Tachinidæ are readily separated from the remaining groups of the Muscoidea by the presence of a strong convexity beneath the scutellum. From an examination of various families I find that this development is limited to three of them. I would suggest that this portion of the anatomy be termed, for convenience, the "metascutellum."

In a paper now in the hands of the printer, I have pointed out that I consider the Syrphidæ more closely allied to the Stratiomyidæ than is generally supposed and also their evident relationship to the Calyptrata. As the families Stratiomyidæ, Syrphidæ and Tachinidæ (inclusive of the Dexiidæ) are the three families known to me which possess a metascutellum, considerable confirmation of my previous conclusions has been secured. The possession of many characters in common by these three families would appear to indicate a much closer relationship than has heretofore been accorded them by taxonomists.

It appears that the Tachinidæ and Syrphidæ are both evolved from an ancestor more or less of the Stratiomyid type, the three families possibly having a common ancestor. At any rate it seems probable that the two first mentioned families originated within a reasonably short time of each other from common stock or very closely related forms.

¹Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

If we accept the foregoing suggestions as being more or less correct, several families—the Dolichopodidæ, Therevidæ, Asilidæ, Empididæ, and a few others, are left without indications of their origin, and it must be admitted that it is difficult to associate these families with any of those usually placed lower in the scale. However, there can be little doubt that these and allied families form a natural group and it is not difficult to trace true or fancied relationships from one family to the other. It may be necessary to eliminate the Tabanidæ from the line of direct descent and to consider for the present that they form a natural branch, therefore concluding that the Asilid group, through the Empididæ, are related to such forms as the Bibionidæ or even the Blepharoceridæ.

Malloch has recently pointed out that the Pyrgotinæ are evidently related to the Conopidæ, a view in which I concur. This indicates rather forcibly the relationship of the Pipunculidæ and Acalyptatæ.

If we consider the matter from the viewpoint of squamæ¹ development, we find that the squamæ are large in the Tabanidæ, Stratiomyidæ, Syrphidæ, Muscoids and Tachinidæ, at least in so far as many members of these families are concerned. The exact value of this structure from the taxonomic point of view has not yet been determined. I am inclined to believe that it is a development more or less confined to robust species which are, or have been in the past, hoverers. Such a development seems to have been induced in flies which bred in liquid media, as the large squamæ have disappeared to a very large extent in those Syrphidæ which do not pass their early stages in such surroundings. If the squamæ have developed due to this habit, they must be looked upon merely as indicating habit and cannot be considered too seriously by the taxonomist.

Further, in connection with the squamæ, it should be pointed out that a character which is almost universal with the Stratiomyidæ occurs in the families enumerated in the preceding paragraph, but is not general. This is the presence of fine hairs or sparse pile on the upper surface of the lower squama, a character which is very evidently derived from the pubescence usually

found, but which has disappeared in many Tachinidæ. These hairs are found in some Stratiomyidæ, *Syrphus* s. s., *Bombyliomyia* of the Tachinidæ, and several Calliphorid genera. Here again we have a character of doubtful value taxonomically, but one which might be considered to indicate relationship, and at the same time one which may be used to great advantage in the treatment of several genera.

It should be remembered that there are many characters not of true generic or family significance which are nevertheless of the greatest importance as aids in determination, and it seems advisable in very many cases to treat these as of generic importance merely for our convenience. If, by the use of such characters, we split up several genera, placing many of their representatives in a single genus, and eliminate other supposed genera, we are simplifying the determination of many species; it is surely advisable to use such a character. If our classification is such that genera are of but little assistance in the determination of species, or are not truly separable from each other, it is evident that we need a change in methods:—either that, or the elimination of genera entirely and the use of family names in a generic sense. A superabundance of genera is almost an equivalent of the foregoing condition. Perhaps the best example of this latter condition is to be found in the Tachinidæ where more than one thousand genera have been proposed, and at least half that number are recognized. It is not likely that more than one hundred genera should be recognized in this family if we are to have a classification of the maximum assistance in determination of the species. Characters being investigated at present indicate that several genera in the Tachinidæ and Dexiidæ can be lumped together to great advantage, or at any rate isolated into very distinct and easily recognized groups.

The above information is submitted in the hope that work along the lines indicated may be stimulated. There is much to be done but one must proceed carefully in dealing with a subject of this nature, taking pains not to overemphasize the value of such characters as have been enumerated, and to investigate as fully as possible before recording results.